

## FIELD OF THE INVENTION

The present patent relates to a self-centering unit to be associated with tire removal machines, to maintain wheel rims locked in a horizontal position while demounting and/or mounting the corresponding tires.

- 5 The automobile industry currently markets vehicles provided with wheel rims of a diameter which exceeds the range within which traditional self-centering units operate.

To be able to also operate on large-dimension wheel rims, a self-centering unit is known comprising a horizontal plate mounted on an underlying  
10 vertical shaft of the tire removal machine. Said plate presents a circumferential series of angularly equidistant radial slots, with each of which there is associated a slide carrying a head or clamping jaw for gripping the edge of the wheel rim from the inside or outside.

The head is associated with the slide in such a manner as to be able to  
15 translate in the direction of the travel axis of the slide in order to occupy two different operative positions, locking means being present to lock the head in the chosen operative position.

Although the described device performs the function for which it is provided, it presents certain drawbacks. A first drawback is the need to  
20 individually move each head relative to the slide to adapt the self-centering unit to large-dimension wheel rims. This operation is lengthy and laborious, the operator often forgetting to move a head, with the result that when the wheel rim is gripped by the heads it is not in the correct working position and risks undergoing damage.

## SUMMARY OF THE INVENTION

The object of the present invention is to overcome the drawbacks of the known art within the context of a simple and rational solution.

5 The invention achieves said object by virtue of the characteristics defined in the claims.

Specifically, the invention provides a self-centering unit comprising a plate provided with a series of angularly equidistant radial slots, in each of which a clamping jaw is received and slides to grip the edge of a wheel rim, said  
10 clamping jaws being linked together in such a manner as to be always equidistant from the axis of said plate, at least one clamping jaw being associated with actuator means for translating it in a radial direction.

According to the invention, between said at least one clamping jaw and said actuator means there is provided a positioner device arranged to vary  
15 the working position of said clamping jaws relative to the actuator means, without modifying their travel stroke.

In a preferred embodiment of the invention, said actuator means are associated with two opposing clamping jaws, a positioner device being interposed between each clamping jaw and the actuator means.

20 According to the invention, said actuator means for translating the clamping jaws are at least one pneumatic cylinder-piston unit.

The characteristics and constructional merits of the invention will be apparent from the ensuing detailed description given with reference to the figures of the accompanying drawings, which illustrate a particular

preferred embodiment thereof by way of non-limiting example.

## BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a plan view of the self-centering unit of the invention from  
5 above.

Figure 2 is a plan view of the self-centering unit of the invention from  
below.

Figure 3 shows the section III-III of Figure 1.

Figure 4 is an enlarged-scale view of a detail of Figure 3.

10 Figure 5 is a three-dimensional view of part of a detail of the invention.

Figures 6 and 7 show the view of Figure 4 in different operative stages.

Figure 8 is a side view of a variant according to the invention.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

15 Said figures show a self-centering unit 1 comprising a horizontal plate 2 to  
be associated with a vertical shaft 3 branching from the base of a usual  
tire removal machine, not shown.

The purpose of the shaft 3 is to rotate the self-centering unit 1 during the  
demounting or mounting of the tire from or on the wheel rim by the usual  
20 means with which the tire removal machine is provided.

The plate 1 presents four angularly equidistant identical radial slots 4. In  
each slot 4 there is slidably mounted a slide 5 (Figure 1) provided on its  
upper side with a double acting clamping jaw 6, i.e. able to lock a wheel  
rim 7, shown by dashed and dotted lines in Figure 3, from the inside or

from the outside.

With reference to Figures 2, 3 and 4, each slide 5 lowerly presents a threaded pin 55 (Figure 4), the axis of which intersects the longitudinal axis of the corresponding radial slot 4, and on which there is mounted a bush 8 on which a pair of identical overlying connecting rods 9 are pivoted by way of an interposed spacer 10. The opposing ends of the connecting rods 9 are hinged to the corners of two identical overlying square plates 11 (Figure 2) mounted idly on the shaft 3, so that the two connecting rods 9 of each pair are disposed symmetrical about the direction in which the corresponding clamping jaw 5 travels (Figure 2). The function of the plates 11 and connecting rods 9 is to link together all the clamping jaws which grip the edge of the wheel rim 7 such that they are always equidistant from the axis of the shaft 3 of the tire removal machine.

Two opposing slides 5 are associated, via a positioner device 20, with two cylinder-piston units 12 disposed on one and the other side of the shaft 3, their function being to move the clamping jaws towards or away from the axis of the shaft 3, to hence cause the clamping jaws to translate radially. Said two opposing slides 5 present lowerly (Figure 5) a descending central stem 13 which terminates with a bush 14 provided with two opposing holes 140 and 141 perpendicular to the axis of the bush. The bush 14 is connected to the said positioner device 20, which comprises a crankshaft 15 provided with a crank 16, on the crankpin 17 of which the bush 14 is mounted. The ends of the crankshaft 15 are connected respectively to said pneumatic cylinder-piston units 12.

Rotating the crankshaft 15 causes the working position of the clamping jaws to vary, i.e. causes them to approach or withdraw from the axis of the shaft 3 without modifying the travel stroke of the clamping jaws. This advantageously enables the self-centering unit to operate even on large-  
5 dimension wheel rims, i.e. with diameters exceeding 20 inches.

The positioner device 20 also comprises means 18 for locking the crankshaft 17 in two opposing working positions, in which the clamping jaws are at their closest point to and farthest point from the shaft axis respectively.

10 With reference to Figure 4, said means 18 are fixed between the arms of the crank 16, and comprise a cup-shaped body 19 the end of which is provided with a hole 190. Within the cup-shaped body 19 there slides a pin 21, one end of which is intended to be received in one of the holes 140 of the bush 14, whereas the opposite end emerges from the cup-shaped  
15 body via said hole 190 and is connected to an operating knob 22. The pin is maintained normally urged into one of the holes 140 by a spring 23 mounted about the pin and contained within the cup-shaped body. Said spring 23 is compressed between the end of the cup-shaped body and an annular shoulder 200 on the pin 21.

20 The operation of the invention is extremely simple. When the operator is to operate on large-dimension wheel rims, i.e. of diameter exceeding 20 inches, he sets the positioner device as shown in Figure 3. To achieve this, starting from the position of Figure 7 the operator extracts the pin 21 from the hole 141 and then rotates the shaft 15 through 180 degrees in a

clockwise direction to bring the pin 21 in front of the hole 140. At this point, by releasing the knob the pin penetrates into the hole and locks the clamping jaw in position. It should be noted that this operation can be performed on only one or on both of the positioner devices, depending on  
5 the diameter of the wheel rim on which to operate.

Figures from 8 to 10 show a variant of the invention which differs from the aforescribed embodiment with regard to the constructional form of the positioner device.

In the description of this variant of the invention, those components  
10 identical to and already described in the first embodiment of the invention are indicated by the same reference numerals.

The figures show two opposing slides presenting at their rear a descending central stem 50 which terminates with a bush 51 (Figure 9) connected to the cylinder-piston units 12 via a positioner device 25.

15 The positioner device 25 comprises a crankshaft 26 provided with a crank 27, on the crankpin 28 of which the bush 51 is mounted. The ends of the crankshaft 26 are connected respectively to said pneumatic cylinder-piston units 12.

Rotating the crankshaft 26 causes the working position of the clamping  
20 jaws to vary, i.e. causes them to approach or withdraw from the axis of the shaft 3 without modifying the travel stroke of the clamping jaws. This advantageously enables the self-centering unit to operate even on large-dimension wheel rims, i.e. with diameters exceeding 20 inches.

The positioner device 25 also comprises means 29 for locking the

crankshaft 26 in two opposing working positions, in which the clamping jaws are at their closest to and farthest from the shaft axis respectively.

Said locking means are associated with the bush 51, they comprising a U-shaped latch 30, the base wall of which presents a rectangular aperture

5 300 to be received by and to translate on two flat portions 510 of the bush 51. A pin 31 and a spring 32 are positioned in the arms of the latch 30.

The pin 31 is normally received in a matching hole 33 in the crankpin 28 of the crank 27 by passing through a hole 34 in the bush. The spring 32, the function of which is to maintain the pin 31 within the hole 33, is positioned

10 between said arm of the latch 30 and a corresponding cavity 35 provided in the bush wall.

Again in this case the operation of the invention is very simple. To position the device the operator moves the latch 30 against the action of the spring 32 so as to compress the spring 32 and hence cause the pin 31  
15 to leave the hole 33. The operator then rotates the crankshaft 26 through 180 degrees and then releases the latch to cause the pin 31 to enter the hole 33 by the action of the spring 32.